

THAT WHICH IS CLAIMED:

1. An isolated polypeptide comprising the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

5

2. An isolated nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of:

10 a) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

15 b) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

c) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54; and

15 d) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - c) under stringent conditions, or a complement thereof.

20 3. The nucleic acid molecule of claim 2, wherein said sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

25 4. A chimeric gene comprising a promoter capable of driving expression of a sequence in a plant cell operably linked to a nucleotide sequence of claim 2.

5. The chimeric gene of claim 4, wherein the nucleotide sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

30

6. The chimeric gene of claim 4, wherein said nucleotide sequence is the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

5 7. The chimeric gene of claim 4, wherein said nucleotide sequence is the antisense sequence of the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

10 8. A vector comprising the chimeric gene of claim 4.

9. A plant cell transformed with the chimeric gene of claim 4.

10. A plant comprising the chimeric gene of claim 4.

15 11. A transformed plant having incorporated into its genome a DNA molecule, said molecule comprising a nucleotide sequence operably linked to a promoter capable of driving expression of a gene in a plant cell, wherein said nucleotide sequence is selected from the group consisting of:

20 a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53;

b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

30 d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;

e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;  
5 f) a nucleotide sequence encoding a yeast invertase enzyme; and  
g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

12. The transformed plant of claim 11, wherein the nucleotide sequence encodes an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 10 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53.

13. The transformed plant of claim 11, wherein the nucleotide sequence is the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54.

15 14. The transformed plant of claim 11, wherein the nucleotide sequence is an antisense sequence for a plant invertase inhibitor.

15 15. The transformed plant of claim 11, wherein the nucleotide sequence is a yeast 20 invertase.

16. The transformed plant of claim 11, wherein said plant is a dicot.

17. The transformed plant of claim 11, wherein said plant is a monocot.

25 18. The transformed plant of claim 17, wherein said plant is maize.

19. Transformed seed of the plant of any one of claims 16-18.

30 20. A method for modulating invertase activity in a plant cell, said method comprising transforming said plant with a DNA construct, said construct comprising a

promoter that drives expression in a plant cell operably linked with a nucleotide sequence selected from the group consisting of:

- a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44, 47, 50, or 53;
- b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;
- c) a nucleotide sequence that corresponds to an antisense sequence for the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;
- d) a nucleotide sequence that corresponds to an antisense sequence for a plant invertase inhibitor;
- e) a nucleotide sequence having at least 80% sequence identity to the sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;
- f) a nucleotide sequence encoding a yeast invertase enzyme; and
- g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.

21. A method for increasing yield in a plant, said method comprising transforming said plant with a DNA construct, said construct comprising a promoter that drives expression in a plant cell operably linked with a nucleotide sequence selected from the group consisting of:

- a) a sequence encoding an invertase inhibitor having the amino acid sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;
- b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

20 c) a nucleotide sequence that corresponds to an antisense sequence for the  
nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15,  
16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46,  
48, 49, 51, 52, or 54;

5 d) a nucleotide sequence that corresponds to an antisense sequence for a plant  
invertase inhibitor;

10 e) a nucleotide sequence having at least 80% sequence identity to the  
sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24,  
25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

15 f) a nucleotide sequence encoding a yeast invertase enzyme; and

20 g) a nucleotide sequence that hybridizes to any one of the nucleotide  
sequence of a) - f) under stringent conditions, or a complement thereof.

22. A transformed plant cell having incorporated into its genome a DNA molecule,

15 said molecule comprising a promoter capable of driving expression of a gene in a plant  
cell operably linked to a nucleotide sequence selected from the group consisting of:

25 a) a sequence encoding an invertase inhibitor having the amino acid  
sequence set forth in SEQ ID NO: 2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44,  
47, 50, or 53;

30 b) the nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12,  
13, 15, 16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48,  
49, 51, 52, or 54;

25 c) a nucleotide sequence that corresponds to an antisense sequence for the  
nucleotide sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15,  
16, 18, 19, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46,  
48, 49, 51, 52, or 54;

30 d) a nucleotide sequence that corresponds to an antisense sequence for a plant  
invertase inhibitor;

25 e) a nucleotide sequence having at least 80% sequence identity to the  
sequence set forth in SEQ ID NO: 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 22, 24,  
25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51, 52, or 54;

- f) a nucleotide sequence encoding a yeast invertase enzyme; and
- g) a nucleotide sequence that hybridizes to any one of the nucleotide sequence of a) - f) under stringent conditions, or a complement thereof.